



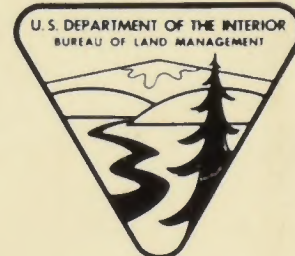
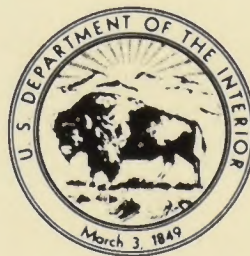
## Draft EIS

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### Draft EIS for the HD Mountains Coalbed Methane Gas Field Development Project



U.S. Department of Agriculture  
Forest Service  
San Juan National Forest  
Durango, Colorado



U.S. Department of Interior  
Bureau of Land Management  
San Juan Resource Area  
Montrose District  
Durango, Colorado

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San Juan  
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Forest

701 Camino Del Rio, #301  
Durango, CO 81301  
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REPLY TO: 1950

DATE: February 11, 1991

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BUREAU OF LAND MANAGEMENT  
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Dear Friend:

I have enclosed a copy of the Draft Environmental Impact Statement (DEIS) for the H.D. Mountains Coalbed Methane Gas Field Development Project on the Pine District of the San Juan National Forest. The Bureau of Land Management is a cooperating agency and has assisted the Forest Service in preparing the DEIS.

Three public meetings will be held to provide information about the environmental impact statement process. These meetings will be very similar to "open houses". Locations and dates of the meetings are:

February 19, 1991 - 2:00 pm - 8:00 pm  
Bayfield Lions Hall  
Bayfield, Colorado

February 20, 1991 - 2:00 pm - 8:00 pm  
La Plata County Fairgrounds  
Extension Building  
Durango, Colorado

February 21, 1991 - 2:00 pm - 8:00 pm  
Sky Ute Lodge  
Ouray Room  
Ignacio, Colorado

The Forest Service invites written comments on the DEIS. Written comments will be accepted at the Pine District Office in Bayfield (367 S. Pearl, Bayfield). There is a 45 day comment period. Written comments must be received by April 8, 1991. Comments submitted in response to the DEIS will be assessed and considered in the Final EIS to be completed later.

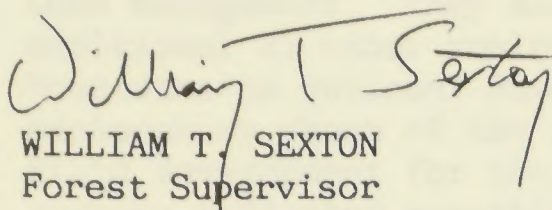
Written comments should be mailed to Michael G. Johnson, P.O. Box 439, Bayfield, Colorado 81122. If you have any questions, please contact Dick Bell at (303)884-2512.



Also attached is a brief description of the purpose and need for an EIS, the purpose and value of public comment and a description of the chapters of the EIS.

Your continued interest in the administration and management of the San Juan National Forest is appreciated. Thank you.

Sincerely,

  
WILLIAM T. SEXTON  
Forest Supervisor

Enclosures



## SUMMARY

### **Purpose and Need for an Environmental Impact Statement**

Amoco Production Company submitted Applications for Permit to Drill five coalbed methane gas wells on the San Juan National Forest with the Bureau of Land Management. They also expressed an intent to develop and operate an additional 21 other coalbed methane gas wells on leaseholds in the H.D. Mountains on National Forest System lands. These actions demonstrated that the exploratory phase of the operation had been sufficiently completed to begin field development for the coalbed methane gas. Public interest and agency concern indicated possible significant effects to the human environment. The National Environmental Policy Act of 1969 requires the agencies to prepare Environmental Impact Statements (EIS) to document the results of analysis of a major Federal action that will significantly affect the human environment.

The purpose of an EIS is to provide a full and fair discussion of significant environmental impacts of oil and gas development in the H.D.'s and to inform the decision makers and the public of reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment.

### **Purpose and Value of Public Input**

There is often confusion on how public input is used. Some people believe the Forest Service makes decisions about public lands without consideration of citizens opinions, or that the Forest Service pays no more than lip service to public input. Other people feel that the Forest Service should "count votes" and make decisions based on the number of letters and statements received on an issue. Yet others feel that their desires for dramatic changes should be considered without explaining the basis for these desires.

These perceptions raise an important question: How does the Forest Service use public input in making decisions?

Forest Service decisions are based on five factors: (1) the law, (2) technical information, (3) resource capability, (4) professional judgement, and (5) public input. Public input enters into the decision making process when there is room for interpretation in any of the first four factors. Public input, for example, would not be a factor in citing a violator of Federal regulations, but it does influence decisions about where Forest management could emphasize one use versus another.

Use of public comment is not merely a vote-counting process, however. The decision-maker must consider each comment against legal, technical, and professional judgement constraints. Comments need to be substantive, with specific reasons and rationale to back-up any recommendations or suggestions by the commentor.



## Summary Description of the EIS Chapter Contents

The contents of the EIS displays the following information. Chapter 1 is the introduction, beginning with a description of the proposal, describing why action is needed, the environmental analysis process, land and legal status, specific organizational responsibility, issues and concerns and opportunities.

Chapter 2 displays the three alternatives and also includes proposed construction, operation and facility descriptions. It also displays the alternatives considered but not analyzed in detail.

Chapter 3 contains a description of the affected environment by specific resources present.

Chapter 4 discloses the environmental consequences by alternative for each of the specific resources.

Chapter 5 contains a comparison of the direct, indirect and cumulative impacts expected from implementation of each alternative, the irreversible and irretrievable commitments of resources and the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity.

Chapter 6 has a description of measures recommended for mitigation and monitoring.

Chapter 7 describes the consultation and coordination which includes public participation and involvement and a listing of the preparers of the document.

Chapter 8 lists the references used.

There are three appendices: the Forest Service and Bureau of Land Management Standard Stipulations and mitigation measures; an explanation of the exclusion area in the H.D. Mountains; and the technical appendices.





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DRAFT ENVIRONMENTAL IMPACT STATEMENT

for the

H.D. MOUNTAINS COALBED METHANE GAS FIELD DEVELOPMENT PROJECT

PINE DISTRICT, SAN JUAN NATIONAL FOREST

Archuleta and La Plata Counties, Colorado

Type of Action: Administrative

Lead Agency: USDA - Forest Service

Cooperating Agency: USDI - Bureau of Land Management

Responsible Officials:

William T. Sexton, Forest Supervisor  
San Juan National Forest  
701 Camino Del Rio  
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Sally Wisely, Area Manager  
San Juan Resource Area  
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For Further Information Contact:

Michael G. Johnson, District Ranger  
Pine District, San Juan National Forest  
P.O. Box 439  
Bayfield, Colorado 81122  
(303)884-2512

Abstract: Three alternatives for the H.D. Mountains Coalbed Methane Gas Field Development Project for the 56,910 acre study area within the boundary of the San Juan National Forest are described and evaluated. The alternatives are: Alternative A, the "No Action Alternative" emphasis is on opportunities to complete and operate the existing wells; Alternative B, the "Proposal" emphasis is on opportunities to develop and operate 34 additional coalbed methane gas wells within the study area; and Alternative C, the "Current Direction Alternative" emphasis is on opportunities to develop and operate a total of 115 new coalbed methane gas wells within the study area.

Comments must be received by: APR 8 1991

Please retain your copy of this draft EIS. Unless the extent of public comment is such as to require that it be substantially revised, the final EIS is anticipated to be a supplement to this draft statement.

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For the

U.S. MOUNTAIN COASTED RANGE AND TIGER RESERVATION PROJECT

THE BUREAU OF LAND MANAGEMENT

Archives and the State of Colorado

Type of action: Administrative

Lead agency: BLM - Forest Service

Cooperating agency: BLM - Bureau of Land Management

Responsible officials:

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San Juan National Forest  
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For further information contact:

Michael D. Johnson, District Manager  
San Juan National Forest  
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Durango, Colorado 81301  
(303) 247-4000

Abstract: Three alternatives for the U.S. Mountain Coated Range and Tiger Development Project for the 1980s are being evaluated and reviewed. The alternatives are: San Juan National Forest and adjacent lands; Alternative A, the "Proposed" project; Alternative B, the "Proposed" project; and Alternative C, the "Proposed" project. The project is an opportunity to develop and operate a wildlife refuge within the study area. The project is an opportunity to develop and operate a wildlife refuge within the study area. The project is an opportunity to develop and operate a wildlife refuge within the study area.

Comments must be received by: APR 8 1981

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## BACKGROUND

The Amoco Production Company (Amoco) proposes to drill 34 coalbed methane (CBM) gas wells in the HD Mountains area in and around the San Juan National Forest located in southwestern Colorado. This draft Environmental Impact Statement (DEIS) analyzes the impacts from the proposed drilling and production of these wells, and fulfills the requirements of the National Environmental Policy Act (NEPA).

The U.S. Department of Agriculture (USDA), Forest Service, San Juan National Forest is the lead agency responsible for this EIS. The Bureau of Land Management (BLM), San Juan Resource Area is a cooperating agency. Evaluation of this proposal, including alternatives, was developed through interdisciplinary review with representatives from Amoco, the U.S. Forest Service, the BLM, and the Colorado Division of Wildlife. Interdisciplinary participation was provided by a third party contractor, a private consultant working under the direction of, and in cooperation with the Forest Service. To help better define issues and concerns related to the proposed action, the Forest Service issued a scoping document on November 3, 1988. The public was asked to provide comment. In addition, two public scoping meetings were held in Bayfield, Colorado, on May 14, 1989, and June 15, 1989. Written comments received in response to the scoping document and public input from the scoping meetings were used in preparation of this EIS.

Amoco currently holds numerous leases for lands which will be affected by the proposed project. These lands were determined to be leasable based on an environmental analysis conducted prior to leasing, and on the San Juan National Forest Land and Resource Management Plan's EIS which identified these lands as capable of having a medium to high potential for leasing due to the area's potential for reclamation and restoration. Several stipulations are included in the Amoco leases. These stipulations are as follows:

Stipulations for Land Under Jurisdiction of the USDA - Form 3109-3 (requires compliance with USDA's rules and regulations on National Forest System (NFS) lands).

Surface Disturbance Stipulation (requires that surface disturbing operations receive prior agency approval). This stipulation also requires an environmental analysis of impacts. Upon completion of the environmental analysis, any mitigation measures to which the proposed surface disturbing





operations will be attached to the Application for Permit to Drill, Deepen, or Plug Back as Conditions of Approval.

Supplemental Stipulation to Stipulation for Land Under the Jurisdiction of the USDA supplement to Form 3109-3. (Provides protection for existing roads, trails, streams, improvements, and cultural resources by establishing limited distances for site occupancy.)

Some leases contain the following stipulation:

Limited Surface Use Stipulation - This stipulation permits occupancy in the period from May 1 to November 15 for the purposes of protecting wintering wildlife.

## PROPOSED ACTION AND ALTERNATIVES

Three alternatives are presented in this EIS. Alternative A is the No Action Alternative, Alternative B is the Proposed Action Alternative, and Alternative C is the Current Direction Alternative.

### Alternative A

A No Action Alternative is required by NEPA procedural regulations, and serves as a baseline for comparing and measuring the effects of the other alternatives. In this case, the No Action Alternative would not permit the proposed Amoco wells to be drilled on NFS lands, but would allow the completion of the combined access road/flowlines network to 21 existing coalbed methane gas wells and one existing conventional natural gas well located on NFS lands. (Note: One of the coalbed methane gas wells and the conventional gas well are located on the same well pad.) This alternative includes approximately 19 miles of flowlines to be constructed on NFS lands, and an additional 6.5 miles would be located on private lands.

The Forest Service and the BLM have limited authority to implement this alternative because leases have already been granted. An oil and gas lease grants the lessee the "right and privilege to drill for, mine, extract, remove, and dispose of all oil and gas deposits". The Secretary of the Interior has limited authority to deny activity upon the lease, and only Congress has complete authority.





## Alternative B

Alternative B considers the proposed action by Amoco. Of the 34 proposed wells, six will be located on private lands and 28 on National Forest System lands. Each well pad will be approximately 3 acres in size. In addition to the well pads, approximately 27.5 miles of combined new access road flowlines will be constructed and approximately 25.5 miles of just flowlines for methane gas and production water will be installed. The total acreage of surface disturbance from wellsite and transportation right-of-row (ROW) construction on NFS lands is estimated to be 271. Amoco has submitted Applications for Permit to Drill for five wells which are located in the Sauls Creek area. These wells are scheduled to be developed first.

No surface discharge of produced water is proposed. Produced water will be transported by flowlines to disposal well facilities located on private land. One of two compressor stations will be located on the Forest. At the end of production, the abandonment process would include disassembling and removing surface equipment and facilities; plugging/sealing the full wellbore with cement; plugging/sealing at strategic locations within the casing; removing gravel surfaces of well pads and access roads; backfilling and grading disturbed areas; installing erosion control features if necessary; tilling/preparing the surface for seeding; and adding seed, mulch, and amendments as necessary to promote the reestablishment of vegetation.

## Alternative C

Alternative C considers the development of all of the coalbed methane gas field which is technically and economically feasible for production. This would involve the potential development of 95 wells and the associated access roads, flowlines, and compressor stations on NFS land. In addition, one well would be located on state land, and 20 wells on private land. Development would occur over the next seven years. The estimated acreage of disturbance on NFS lands resulting from implementing this alternative is 646 acres.

## ISSUES AND CONCERNS

The public has identified several issues areas of concern associated with the proposed project. These areas were identified in response to the scoping document and scoping meetings. In addition, resource specialists have emphasized areas of special concern. The following resource areas have been identified as having one or more specific concerns associated with them: wildlife, water quality, archeological resources, noise, dust, traffic, recreation, visuals, and socioeconomics.





## MAJOR IMPACT CONCLUSIONS

Drilling of the proposed CBM gas wells would cause short-term and long-term disturbance to and displacement of the human and natural environments. Chapter 4 of this EIS describes the environmental consequences that could result from implementing the proposed action or the alternatives. Chapter 5 provides a comparative analysis of the alternatives. Chapter 6 details the proposed mitigation measures. A brief description of the affected environment for each resource and their related impacts are included in the following summary.

### Soils and Geologic Hazards:

Several soil types were identified in the study area. These soils can generally be described as shallow to deep, well drained, fine textured to medium textured and formed from materials derived from interbedded sandstone and shale. The reclamation and revegetation potential for most of the soils are fair to good. The geologic hazards identified for the study area are limited to landslide deposits, areas potentially subject to landslides, and observed surface instability/erosion.

Comparisons of impacts resulting from implementation of the three alternatives indicates the extent of disturbance to soil resources and surface stability increased on NFS lands within the Study Area by an average multiple of about seven from Alternative A to Alternative B and by an average multiple of about 2.5 from Alternative B to Alternative C. Application of mitigation measures would reduce acres of lost soil productivity to approximately one half for the life of the project. Mitigation and sound engineering practice would also reduce impacts related to surface stability, slope, and erosion to essentially zero.

### Water Resources:

Both surface and groundwater resources are discussed in Section 3.2, including a discussion of water quality. The two primary rivers draining the Study Area are the Piedra and the Los Piños rivers. Water quality for the Piedra River is generally considered good, while the Los Piños River water quality data shows some degree of human impacts. Several aquifers were identified in the Study Area, and water quality varies among the aquifers.

Implementation of the three alternatives on NFS lands would result in the crossing of eight, 18, and 55 intermittent streams by the transportation network for Alternatives A, B, and C, respectively. With increases





in stream crossings, the potential for adverse effects on channel configuration and water quality and quantity during periods of flow also increases. Sources of adverse effects are increased sedimentation of streams from soil erosion from disturbed areas, particularly those close to the stream, and accidental releases of contaminants during field construction and operations. Immediate and effective responses to any such releases should minimize impacts to surface and ground waters. Proper construction and operation of CBM wells would prevent cross contamination of aquifers, particularly the near surface aquifers which support area water wells.

#### Meteorology and Air Quality:

The climate of the study area is variable due to the rugged topography, but it can generally be said that temperatures decrease and precipitation increases with increasing elevation. Winds are also variable, but the predominant wind direction is from the west-northwest with speeds ranging from three to ten knots. Air quality is generally good.

Locally elevated pollutant levels of dust and vehicle emissions may exist for short periods during construction and some operations activities. Projected emissions for the operations phase for each of the three alternatives are well below the federal and state air quality standards. Use of background air quality conditions for the City of Durango in combination with projected emissions for the three alternatives indicates cumulative impacts to air quality in the Study Area would be well below federal and state air quality standards.

#### Vegetation, Timber, and Grazing:

Vegetation found in the study area is typical of the foothills and montane zone of the southern Rocky Mountains. Major vegetation types include coniferous forest, piñon-juniper woodland, Gamble oak, sagebrush, and grassland. The vegetation of the area provides limited timber production and some forage for livestock.

Implementation of the three alternatives on NFS lands would result in the removal of natural vegetation from approximately 46 acres, 271 acres, and 646 acres for Alternatives A, B, and C, respectively. Revegetation of some disturbed areas after construction of facilities is completed would leave 112 acres for Alternative B and 316 acres Alternative C cleared of vegetation for the duration of the project. Acres of disturbance to wetlands and riparian areas would be reduced from 7.9 to 0.2 acres for Alternative A, 47 to





1.4 acres for Alternative B, and 181 to 5.1 acres for Alternative C with the application of mitigation measures. Losses of timber acreage and grazing lands would not exceed one percent for either under any alternative.

#### Wildlife and Fisheries:

Numerous wildlife and fisheries resources occur in the Study Area. A detailed discussion of habitats, threatened and endangered species, big game, fisheries, and other wildlife groups of concern that are present, or potentially present, in and around the study area can be found in Section 3.5.

Implementation of the three alternatives on NFS lands would result in the direct loss of wildlife habitat totaling 46 acres, 271 acres, and 646 acres for Alternatives A, B, and C, respectively. Revegetation would restore habitat for all alternatives. For the high sensitivity issue of big game winter range, acres of reduced use, nonuse, and reduced habitat effectiveness increases from Alternative A, to Alternative B, and to Alternative C. The application of appropriate mitigation measures should reduce the levels of impact to big game winter range. Threatened, endangered and candidate species should not be impacted.

#### Visual Resources:

Most of the Study Area is considered to be of common or average scenic quality. The sensitivity level (a measure of people's concern for scenic quality) is primarily moderate, with one area of high sensitivity. The degree of acceptable alteration of the natural landscape present in the Study Area ranges from high to low, depending on the area.

Implementation of the three alternatives on NFS lands would result in impacts to 1.0 acre, 1.0 acre, and 35 acres of high visual sensitivity for Alternative A, B, and C, respectively. The application of appropriate mitigation measures will reduce the impact of visual contrasts for most project facilities. Past land management activities and current development of CBM field facilities coupled particularly with the implementation of Alternative C would result in long-term adverse visual impacts.





#### Cultural Resources:

Presently, 448 archaeological and historic cultural resource localities are known to occur within the Study Area. Six sites are currently listed in the National Register of Historic Places, and another 79 have been recommended by archaeologists as being eligible for listing. One hundred twenty four sites are not eligible, which leaves 239 with no eligibility recommendations or determinations.

Implementation of the three alternatives on NFS lands with required mitigation measures applied would not result in any significant impacts as described by CFR 36 60.4.

#### Land Use:

Major area wide land uses include watershed restoration, rangeland/forest, oil and gas development, agriculture, residential and communication facilities. The greatest area of land use is rangeland/forest which is used for livestock grazing and wildlife habitat. Lineal land uses include gas and water flowlines, access roads, and one electrical transmission line. Planned future land uses are primarily oil and gas exploration and development.

Five acres of high land use sensitivity would be impacted by implementation of Alternative C on NFS lands. Short-term indirect adverse effects from noise, traffic, and dust to nearby residences would result particularly from construction of all alternatives. Such impacts would be proportionally greater for Alternatives B and C over Alternative A.

#### Transportation:

Major transportation routes in the Study Area include a U.S. highway, county roads, and Forest Service roads. Most of the county roads are in fair to poor condition. Concern has been expressed by various road officials about the deteriorating quality of roads and safety issues in the Study Area.

Implementation of the three alternatives on NFS lands would produce an estimated 2,893,30,080, and 77,046 vehicle roundtrips for Alternatives A, B, and C respectively. Such activity would proportionally, by alternative, result in increased traffic volumes with direct adverse effects on rates of road surface deterioration and maintenance requirements. Indirect effects would proportionally, by alternative, also result





in increased noise and dust levels to nearby residences and reduced levels of safety for all users of the affected roads.

#### Noise:

Baseline noise levels in the Study Area have been estimated to range from approximately 35 to 70 decibels, depending on population density and proximity to existing industrial and agricultural/ranching activities. Noise levels below an average yearly day-night sound level of 55 decibels have been identified as the maximum noise level that would not adversely affect public health and welfare by interfering with outdoor activities.

Regardless of the alternative, receptor locations greater than approximately 1,000 feet from a noise source would not be adversely affected by project activities. The application of mitigation measures could reduce impacts to a receptor located within 1,000 feet of a noise source to acceptable level depending on site conditions.

#### Recreational Resources:

Compared to other areas of the San Juan National Forest, recreation use or demand in the Study Area is low. Major activities include hunting, firewood gathering, fishing, sightseeing, and camping.

Direct and cumulative impacts to recreation resources were greatest for Alternative C. The impacts included 1) reduced quality of recreation opportunities due to increased noise, dust, and traffic throughout the Study Area, 2) conflict with a Recreation Opportunity Spectrum (ROS) management area which prescribes management for semi-private, non-motorized recreation opportunity, and 3) increased access opportunities to much of the Study Area which could enhance dispersed recreation opportunities. The application of mitigation measures would minimize impacts to recreation resources. Indirect adverse impacts for all alternatives would be short-term effects of noise, dust, and traffic on recreation activities.

#### Socioeconomic Conditions:

Section 3.12 provides a detailed discussion on existing socioeconomic conditions in La Plata County. Topics covered in this discussion include the local economy, population, housing, public facilities, services and fiscal conditions, and local attitudes and opinions.





Adverse and positive direct, indirect, and cumulative effects were identified for the three alternatives. Adverse effects would be mostly indirect impacts on Study Area residents' lifestyle resulting from increased noise, dust, and vehicle traffic. Such impacts would be mostly short-term for Alternatives A and B; however, these impacts would continue in some portion of the Study Area for an estimated seven or more years of field development and the subsequent 37 years that the field would likely be in operation. Positive effects to economic conditions and local tax revenues would increase proportionally by alternative from Alternative A to C.

#### Health and Safety

The chance of vehicular accidents occurring for Alternative B and C would exceed 100 percent. The chances of injury resulting from such accidents would exceed 80 percent and 230 percent for Alternatives B and C, respectively. Chances of fatality would exceed 30 and 90 percent for Alternatives B and C, respectively.

#### MITIGATION AND MONITORING

Mitigation measures and monitoring requirements for each resource area are described in Chapter 4, Environmental Consequences. In addition, Chapter 6 summarizes these measures and requirements. Mitigation measures and monitoring requirements were developed through an analysis of the expected impacts for each resource area. They generally include a description of the construction, drilling, operations, production, and reclamation that should be employed to comply with lease stipulations or to avoid adversely affecting resource values.





## LIST OF ABBREVIATIONS

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AASHTO	American Association of State Highway and Transportation Officials
ACHP	Advisory Council on Historic Preservation
ADT	Average Daily Traffic
APD	Application for Permit to Drill, Deepen, or Plug Back
API	American Petroleum Institute
ATV	All terrain vehicle
AUM	Animal Unit Month
BEA	Bureau of Economic Analysis
BI	Beneficial Impacts
BLM	Bureau of Land Management
BOP	Blow-out Prevention
BOPE	Blow-out Prevention Equipment
CBM	Coal-bed methane
CBR	Ca. Bearing Ratio
CCR	Code of Colorado Regulations
CDLE	Colorado Department of Labor and Employment
CDOH	Colorado Department of Health
CDOW	Colorado Division of Wildlife
CEQ	Council for Environmental Quality
CFR	Code of Federal Regulations
CNAP	Colorado Natural Areas Program
CO	Carbon monoxide
CO <sub>2</sub>	Carbon dioxide
COGCC	Colorado Oil and Gas Conservation Commission
CRS	Colorado Revised Statutes
DAU	Data Analysis Unit
dB	Decibel
dBA	A-weighted decibels
DEA	Diethanolimine
DWM	District Wildlife Manager
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FDR	Forest Development Road
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Unit
FSH	Forest Service Handbook
FSM	Forest Service Manual
GMU	Game Management Unit
HC	Hydrocarbons
ICS	Industrial Source Complex
LPC	La Plata County
MI	Unavoidable Adverse Impacts, Mitigable
MIS	Management Indicator Species
MUTCD	Manual Uniform Traffic Control Devices





# LIST OF ABBREVIATIONS (Continued)

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NA	Not Applicable
NAS	National Academy of Science
NEPA	National Environmental Policy Act
NFS	National Forest System
NMDOL	New Mexico Department of Labor
NMGF	New Mexico Game and Fish
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NOX	Oxides of nitrogen
NRHP	National Register of Historic Places
NSI	No Significant Impacts
NSO	No Surface Occupancy
NTL	Notice to Leasee
OSHA	Occupational Safety and Health Administration
pH	Numerical measure of acidity or hydrogen ion activity
PIC	Planning Information Corporation
PILT	Payment in lieu of taxes
PM-10	Respirable particulate matter less than 10 microns in aerodynamic diameter
PSD	Prevention of Significant Deterioration
RCRA	Resource Conservation and Recovery Act
ROS	Recreation Opportunity Spectrum
ROW	Right-of Way
SCLDF	Sierra Club Legal Defense Fund
SCORP	Colorado Statewide Comprehensive Outdoor Recreation Plan
SCS	Soil Conservation Service
SE	Standard error
SHPO	State Historic Preservation Officer
SO2	Sulfur dioxide
SPNM	Semi-private, non-motorized recreation
TCPU	Transportation, communication, and public utilities
TDS	Total Dissolved Solids
TSP	Total Suspended Particulates
TSS	Total Suspended Solids
UIC	Underground Injection Control
UMI	Unavoidable Adverse Impacts, Unmitigable
UNK	Unknown quantity of acres impacted
USDA	United States Department of Agriculture
USDI	United States Department of Interior
USFWS	United States Fish and Wildlife Service
USGS	United States Geologic Survey
UTM	Universal Transverse Mercator Coordinate System
VAC	Visual Absorption Capability
VMS	Visual Management System
VOC	Volatile Organic Compounds
VQO	Visual Quality Objectives
WCC	Woodward-Clyde Consultants
WRIS	Wildlife Resource Information System





## LIST OF UNITS

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°F	degrees fahrenheit
°C	degrees celcius
MBTU/hr	thousand British thermal units per hour
MMBTU/hr	million British thermal units per hour
cfs	cubic feet per second
gpm	gallons per minute
mcf	thousand cubic feet
mg/l	milligrams/liter
NTU	normalized turbidity units
mmhos/cm	millimhos per centimeter (standard unit of measurement for electrical conductivity)
μmhos/cm	micromhos per centimeter
μg/m <sup>3</sup>	micrograms per cubic meter
ppm	parts per million
cfm	cubic feet per minute
BCF	billion cubic feet
HP	horsepower
Knots	nautical miles per hour. 1 knot = 1.151 miles per hour
dB	decibels
dBA	A-weighted decibels
Ldn	day-night average sound level. A 10 dBA penalty is applied to the nighttime noise levels in this calculation.
Ld	daytime (7 AM - 10 PM) average sound level
Ln	nighttime (10 PM - 7 AM) average sound level
Ldp	peak daytime sound level
Ln timer	peak nighttime sound level
psi	pounds per square inch
In/In <sup>2</sup>	inches of water per inches of soil

# LIST OF UNITS

degrees Fahrenheit	°F
degrees Celsius	°C
thousand British thermal units per hour	MBTU/hr
million British thermal units per hour	MMBTU/hr
cubic feet per second	cfs
gallons per minute	gpm
thousand cubic feet	Mcf
million gallons	Mgal
million pounds	MMlb
million pounds per year (standard unit of measurement for electrical conductivity)	mmhos/cm
million pounds per year	mmbs/cy
micrograms per cubic meter	µg/m³
parts per million	ppm
cubic feet per minute	cfm
million cubic feet	BCF
horsepower	HP
nautical miles per hour. 1 knot = 1.151 miles per hour	knots
decibels	dB
A-weighted decibels	dBA
day-night average sound level. A 10 dBA penalty is applied to the nighttime noise levels in this calculation.	Ldn
daytime (7 AM - 7 PM) average sound level	Ld
nighttime (7 PM - 7 AM) average sound level	Ln
peak daytime sound level	Ldp
peak nighttime sound level	Lnp
grains per gallon	gpg
inches of water per inch of soil	in/in

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